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The admitted analogies of the peroxide of chlorine have as it were their maximum in the organic peroxide. Not only is chlorine represented in the peroxide, but hydrochloric acid is represented in the organic acid, and a series of parallel equations may readily be constructed, showing the identical character of the reactions of the two classes of substances. Both bleach a solution of indigo, oxidize the protosalts of iron and manganese, decompose water under the influence of sunlight, and evolve oxygen with an alkaline peroxide, forming the salt of the corresponding acid.

XIII. "Explorations in Spitzbergen, undertaken by the Swedish Expedition in 1861, with the view of ascertaining the practicability of the measurement of an Arc of the Meridian." By Dr. OTTO TORELL, Professor of Zoology in the University of Lund. Communicated by the President. Received June 2nd, 1863.

In the year 1858 I made a voyage to Spitzbergen, in company with two other naturalists, in order to investigate the Natural History of that country.

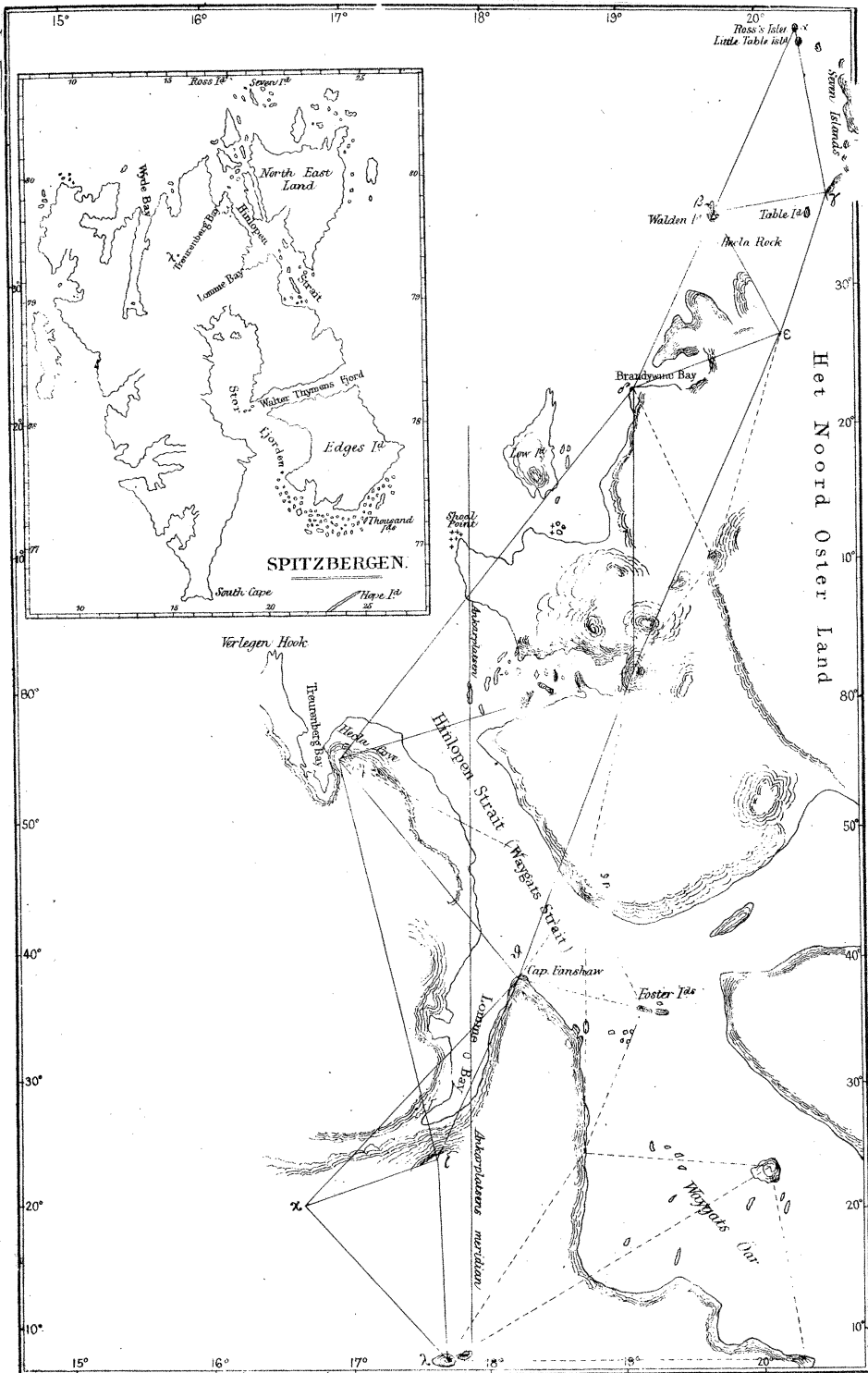
I was thereby induced to study the history of the various Arctic expeditions that had gone out from England.

In Becchey's and Barrow's works I saw mentioned a suggestion which attracted my attention in a high degree. A letter is there given from Captain Edward Sabine to Mr. Davies Gilbert, in which the writer, on his return from his celebrated Pendulum Expedition, proposes to explore Spitzbergen, with the view of ascertaining whether the measurement of an arc of the meridian could be carried out there\*.

An arc from Ross Islet to Hope Island would comprise nearly  $4\frac{1}{2}^{\circ}$  of latitude—equivalent to an arc of  $9^{\circ}$  in the mean latitude of France, and of  $7^{\circ}$  in the mean latitude of Great Britain.

The difficulties opposed by climate and ground were not considered by Captain Sabine to be so great as not to be surmounted; and he offered, in company with another officer and a sergeant of

\* Quarterly Journal of the Royal Institution, vol. xxi. art. xi. pp. 101-108.



Artillery, to show either the feasibility or, once for all, the impossibility of the undertaking. A special advantage is pointed out by Spitzbergen being divided into two nearly equal parts from north to south, thus very materially facilitating communications between the different angular points. Admiral Beechey says that Captain Sabine's plan was placed before the Royal Society in 1825 by Sir John Herschel, taken into consideration in the autumn of the same year, and warmly supported by Mr. Davies Gilbert, Sir Humphry Davy, the then President, and by other members of the Royal Society. The reasons why it was not carried out are not mentioned; but Sir John Herschel leaves us to infer that Captain Sabine was called upon to display his powers in another scientific undertaking of a more arduous though not less important kind. This explanation appeared to be natural, and thus the whole matter was shelved for many years.

The plan in question seemed to me so simple and practical, and at the same time so useful in a scientific point of view, that I could not help espousing it with a very warm interest. In the year 1860, the Swedish government and Diet, as well as Prince Oscar, granted funds for a new scientific expedition to Spitzbergen. Being placed at the head of this undertaking, in which a rather large number of scientific men were willing to take part, I did not fail to call the attention of the Academy of Sciences to the plan proposed by General Sabine in 1825. The Academy were alive to its importance; and their two astronomical members, Professor Selander and Assessor Lindhagen, who had themselves taken part in the Swedish-Norwegian triangulation, considered that the explorations ought to be carried out, and for that purpose they issued the requisite directions to two of the participators in the expedition, Messrs. Dunér and Chydenius. To them it was confided to investigate whether suitable angular points could be found from the islands north of Spitzbergen to Hope Island in the South, either along the western coast of Spitzbergen or through Hinlopen Strait and Weide Jans Water, which nearly divide Spitzbergen into two from north to south. One went on board the ship which, according to the plan, was to explore the north of Spitzbergen and Hinlopen Strait, and the other on board the other ship which was to explore the west of Spitzbergen and Weide Jans Water. At the end of May 1861 the two vessels reached Amsterdam Island, in

nearly  $80^{\circ}$  latitude; and at the commencement of June they passed Verlegen Hook, and anchored in Treurenburg Bay, whence Parry, in 1827, made his celebrated attempt to reach the North Pole. But the polar ice immediately afterwards pressed against the coast, and imprisoned both vessels more than a month in Treurenburg Bay. The pack was so close that no boat excursions of any extent could be made. The explorations for survey were a good deal impeded by this circumstance; for the investigation of the western coast of Spitzbergen could not be commenced until a much later period than intended. The survey of Weide Jans Water could not be carried into effect, owing to drift ice, adverse winds, and calms. Mr. Dunér, to whom this undertaking was allotted, as well as the investigation of the practicability of the survey along the western coast of Spitzbergen, came to the conclusion that no impediments existed for carrying out the triangulation from Ross Islet to Amsterdam Island, but that the mountains surrounding Magdalena Bay are so steep and difficult or impossible of access, that the continuation of the survey southwards must be considered, if not absolutely impossible, at least so difficult and entailing such heavy expense, that its execution along that coast will probably never be carried into effect.

Mr. Chydenius, who was to explore the northern portion of the arc, presumed to be measurable from Ross Islet to Hope Island, was more fortunate in his work. During sundry boat excursions and ascensions of many mountains from the northernmost part of Spitzbergen to the termination of Hinloopen Strait, he succeeded in completely solving the problem as to that part of Spitzbergen, comprising nearly the half of the arc to be measured. The survey was carried out courageously and energetically under circumstances of frequent difficulty, as well in the drift ice as in crossing the glaciers of the interior.

The accompanying map makes a detailed description unnecessary, and I therefore confine myself to stating that all the lines of the sights in the network marked with continuous lines are, with one single exception, observed, and that Mr. Chydenius has had opportunities of convincing himself that though not all the lines of the sights in the network marked with dotted lines are observed, yet nothing prevents the angular points connected by them from being seen one from

the other. The triangles connected by continuous lines of the sights are *nine* in number. Their angles are computed by Mr. Chydenius in an accompanying Table. All the angular points are selected on moderately high and accessible mountains, situated close to, or not very far from the coasts, and the distances between them are not greater than will admit of the signals being easily seen. Mr. Chydenius found the ground, as well in Low Island as to the west of Treurenburg, to be favourable for measuring a base.

As the survey, so far as carried out, proves that, for executing the measurement of an arc of the meridian, no impediments exist which may not be overcome by courage and perseverance, there remains the question whether the part not yet explored may be expected to be equally favourable; the reply to this cannot, of course, be fully given until a similar survey has been made of the still unknown portion; there are, however, means of partially judging of the prospects of success. Mr. Chydenius considers himself almost justified in stating with certainty that the mountains marked  $\lambda$  and  $\chi$  on the map will be found to be visible from Weide Jans Water. He is inclined to think that the easiest communication may be made through Lomme Bay. The distance from Hinloopen Strait to Weide Jans Water cannot be great. According to statements which, however, we were unable to verify, there is said to be a strait connecting these two sheets of water, and a vessel is reported to have sailed through it. Mr. Lamont is also of opinion that Weide Jans Water is open to the north. This, if found to be true, would tend greatly to facilitate the work.

It is also probable that the network can be drawn from the Waigat Islands at the southern embouchure of Hinloopen Strait to the Walter Thymen Bay, through the latter to Weide Jans Water, and further to Hope Island.

There still remains the question as to the facilities that the land on the two sides of Weide Jans Water may afford for the survey. Those walrus-hunters whom I have interrogated regarding that part of the country, are unanimous in their opinion as to the mountains on the western side being similar to those on the west coast, that is to say, as inaccessible as possible. But the country to the east of the said Water is described as a tableland, in which accessible mountains may be found in several places. There are therefore

well-founded reasons for thinking that the whole arc will be found measurable if the survey is continued. Mr. Chydenius has offered to furnish the remaining part of the exploration.

The Swedish Academy of Sciences consider the completion of the survey so important, that they have petitioned Government to supply funds for carrying it into effect during the present or next year. There is every probability that the money will be granted, and, if the result turn out as expected, that necessary steps will be taken for executing the measurement of the arc itself.

The Swedish Government has, at the instance of the Academy of Sciences, already furnished means for preliminary investigations in reference to another geodetic enterprise, namely, for the Swedish share of the proposed large middle-European triangulation from Palermo to Trondhjem, and have asked the Estates for money for executing the measurement. Should, then, the survey in Spitzbergen also be carried out, an important contribution will be made, not only to ascertain the compression of the globe in the vicinity of the North Pole, but also for the much-sought-after knowledge of the real form of the earth on different portions of its surface; and the undertaking will to a certain degree complete the results both of the projected middle-European triangulation and of the Russo-Scandinavian already effected.

If the triangulation in question be executed, it will not be the only result arising from several years' scientific labours in Spitzbergen. It is superfluous here to allude to many investigations of importance which may be made; it is sufficient to keep in mind the situation of Northern Spitzbergen, distant scarcely  $10^{\circ}$  of latitude from the North Pole. There are well-founded reasons for thinking that the execution of the measurement in question may be looked forward to. And if we seek for the origin of the whole matter, we can trace it in Captain Sabine's well-planned and lucidly explained project, which he submitted to the examination of the Royal Society in 1825.